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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/769,763

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Makoto Totani

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8901

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7590

01/14/2008

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RESTON, VA 20191

EXAMINER

PATEL, ISHWARBHAI B

ART UNIT

PAPER NUMBER

2841

MAIL DATE

DELIVERY MODE

01/14/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/769,763

Applicant(s)

TOTANI ET AL.

Examiner

Ishwar (I. B.) Patel

Art Unit

2841

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8, 11-16, 19-21 and 29-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-8, 11-13 and 29-32 is/are allowed.
- 6) ☒ Claim(s) 14 and 19-21 is/are rejected.
- 7) ☒ Claim(s) 15 and 16 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. This action is in response to amendment filed on October 15, 2007.

#### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 14 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arima (US Patent No. 5,281,151) in view of Obata (US Patent No. 6,812,412).

**Regarding claim 14,** Arima in figure 1 discloses circuit board connection structure for connecting, a first circuit board (3) to a second circuit board (2) serving as a mother board, characterized in that said first circuit board has a multilayer structure wherein insulating layers are made from resin (polyimide film 6) and interconnection layers are stacked alternately (see figure), and to electrically connect adjacent interconnection layers together an interlayer connection material (7) is disposed in said insulating layers, in an insulating layer made from resin and constituting a connection face of said first circuit board to be connected to said second circuit board, via holes reaching the inner interconnection layers are formed, and these via holes are filled with a connection material (7), said second circuit board (2) has a multilayer structure

wherein insulating layers and interconnection layers are stacked alternately and an interlayer connection material (5) for electrically connecting adjacent interconnection layers together is disposed in said insulating layers (see figure), at least lands (50) serving as connection terminals are formed on a connection face of said second circuit board (see figure), and inner interconnection layers are used for interconnecting to those lands (see figure), and said first circuit board is connected to said second circuit board by said connection material of the first circuit board being electrically connected to the lands of said second circuit board (see figure) and the insulating layer constituting the connection face of said first circuit board being adhered to the connection face of said second circuit board (see figure 2).

Arima does not explicitly disclose the resin layer forming the first circuit board is thermoplastic resin and second circuit board are welded by thermal welding.

Arima discloses a first circuit board made of polyimide (column 7, line 10-15). Obata discloses a wiring board using a polyimide resin and further recites that it can be a thermoplastic polyimide resin (column 12, line 28-32).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the board of Arima with the first board made of thermoplastic material, as taught by Obata in order to have desired insulating / mechanical properties.

Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Regarding the limitations “said first board part and said second board part are joined by thermal welding,” it is a process limitation in the product claim. Such a process limitation defines the claimed invention over the prior art to the degree that it defines the product itself. A process limitation cannot serve to patentably distinguish the product over the prior art, in the case that the product is same as, or obvious over the prior art. See Product-by-Process in MPEP § 2113 and 2173.05(p) and *In re Thorpe*, 777 F.2d 695, 227 USPQ 964, 966 (Fed. Cir. 1985). The modified board of Arima discloses the structure. Therefore, Arima meets the limitations.

**Regarding claim 19**, the modified board of Arima further discloses that said lands are arranged two-dimensionally on the connection face of said second circuit board (see various plan views).

**Regarding claim 20**, the modified board of Arima discloses all the features of the claimed invention as applied to claim 14 above but does not explicitly disclose that a surface roughening treatment is carried out on at least one of the connection faces of said first circuit board and said second circuit board, to increase bonding strength. However, roughening the surface of either insulating material or conductive material is old and well known in the art to increase the adhesive strength of the surfaces to have better bonding. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the modified board of Arima with a surface roughening treatment is carried out on at least one of the connection faces of

said first circuit board and said second circuit board, in order to increase the adhesive strength of the surfaces to have better bonding.

**Regarding claim 21**, the modified board of Arima discloses all the features of the claimed invention as applied to claim 20 above but does not disclose said surface roughening treatment is carried out by irradiating the connection face with ultraviolet (UV) light. However, how the surface roughening treatment is carried out is a process limitation in the product claim. Such a process limitation defines the claimed invention over the prior art to the degree that it defines the product itself. A process limitation cannot serve to patentably distinguish the product over the prior art, in the case that the product is same as, or obvious over the prior art. See Product-by-Process in MPEP § 2113 and 2173.05(p) and *In re Thorpe*, 777 F.2d 695, 227 USPQ 964, 966 (Fed. Cir. 1985). The modified board of Arima discloses the structure. Therefore, Arima meets the limitations.

***Allowable Subject Matter***

4. Claims 1-8, 11-13 and 29-32 are allowed.
5. Claims 15 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 1 (and dependent claims): A circuit board having a flat plate shaped first board part and a second flat plate shaped second board part disposed stacked on a partial region of the this first board part with limitations "a plurality of second interconnection patterns are disposed on said stacked region of said second board part so as to form pairs with said plurality of first interconnection patterns, and between the pairs of said first interconnection patterns and said second interconnection patterns, interboard connection parts are formed from a connection material which at a temperature applied to melt the thermoplastic resin melts at least partially and electrically connects the first and second interconnection patterns together," in combination with other claimed limitations of the base claim 1 are not disclosed or fairly suggested by prior art of record taken alone or in combination.

Regarding claim 15: A circuit board connection structure for connecting, a first circuit board in which a thermoplastic resin is used as an insulating material to a second circuit board serving as a mother board with the limitation "when the insulating layers of said second circuit board are made from a thermoplastic resin, as the thermoplastic resin constituting the insulating layers of the first board, a thermoplastic resin material having a lower melting point than the thermoplastic resin constituting the insulating

layers of said second circuit board is used" in combination of other claimed limitation of base claim 14 has not been disclosed or fairly suggested by the prior art of record.

Regarding claim 16: A circuit board connection structure for connecting, a first circuit board in which a thermoplastic resin is used as an insulating material to a second circuit board serving as a mother board with the limitation "said connection material includes at least a tin component and a metal component with a higher melting point than the tin component, and is electrically connected to the lands of said second circuit board by the tin component diffusing into the lands" in combination with other claimed limitations of base claim 14 has not been disclosed or fairly suggested by prior art of record taken alone or in combination.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Takubo (US Patent No. 6,329,610) discloses a wiring board and recites the use of thermoplastic polyimide resin as an insulating material (column 13, line 43-45).

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP



§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (571) 272 1933. The examiner can normally be reached on M-F (8:30 - 5:00).

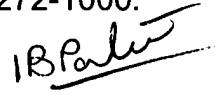
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on (571) 272 2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ibp  
January 6, 2008

  
Ishwar (I. B.) Patel  
Primary Examiner  
Art Unit: 2841